

EE 8215: Human Computer Interaction

Prerequisites Registration within Ryerson's School of Graduate Studies or approval.

Course Web Page www.ee.ryerson.ca/~jasmith/courses/ee8215 & Blackboard

Compulsory Texts: None. Reference texts to be posted or linked to online.

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Calendar Description This course looks at Human-Computer Interface from the perspective of human capabilities and limitations. Human sensory processes and central processing mechanisms will be studied along with optimal design of visual/auditory displays and human control input devices. Topics covered will include memory, attention, human error and decision making. Information theoretical approaches will be discussed in the modelling of human perception and information processing. Experimental techniques will be covered along with measurement and quantification methods. The perception of motion and human motion sensation will be introduced. Applications to be addressed include aviation and space, automation and robotics and various computer interfaces.

Learning Objectives Describe differences between the various approaches that can be used to solve a human computer interaction problem using appropriate tools. Select one specific approach to solve the problem. When the selected approach fails to solve the problem satisfactorily, analyze the cause of failure using standard methods and debugging methodologies. Based on the analysis, come up with new suggestions to improve the existing approach. Integrate the new suggestions into the existing design plan. Judge the completeness and quality of the generated solutions using standard methods and debugging methodologies.

Produce lab and project reports using appropriate format, grammar, and citation styles for technical and non-technical audiences.

Course Organization 3 hours of lecture and discussion per week for 12 weeks

Course Evaluation	Discussion and Brainstorming (Participation)	10% of final grade
	Midterm Project (in-class demo & presentation)	20% of final grade
	Midterm Exam	20% of final grade
	Final Project (in-class demo & presentation)	30% of final grade

Final Exam	20% of final grade
Total	100%

- (a) Discussion & Brainstorming sessions: a number of discussions and design-oriented brainstorming sessions will be held throughout the semester. Your participation grade will be based on your work during these sessions.
- (b) Midterm Exam: A single midterm exam will be held. The midterm exam will be take-home, essay-based and will be submitted electronically through TurnItIn. The topic will be based on your project selection and related to the presentation component of your project. A marking guide will be provided ahead of time.
- (c) Final Exam: A single final exam will be held. The final exam will be take-home, essay-based and will be submitted electronically through TurnItIn. The topic will be based on your project selection and related to the presentation component of your project. A marking guide will be provided ahead of time.
- (d) Midterm & Final Projects: You will choose a project on human-computer interaction early in the semester and be evaluated on it both mid-semester and end-of-semester. This will include a presentation component and a written component published online. The technical scope of the project will be determined on an individual basis, based on a consultation with the instructor. A marking guide will be provided ahead of time.

Project

Hands-on projects are an integral part of the course experience. Project material will be discussed during class time. Project selection and strategies will be tuned to the background and strengths of the individual students. For this reason student participation in the classroom and interaction with other students and the instructor is strongly encouraged.

The midterm and final reports are expected to adhere to IEEE format, including referencing, unless the student eventually intends to submit the work in some form to a non-IEEE publication, in which case the specific publication's formatting style is to be adhered to (and a web link specifying this format is provided by the student to the instructor). Refer to the marking and style guides for details on what is required in these reports.

The hardware and software platforms for the projects will be discussed, debated and decided by the students and instructor during class. Options include -- but are not limited to -- Arduino, PIC32, ARM or Intel hardware platforms, as well as C, AJAX, Python, Processing or Wiring for software.

Course Content

Topic	Readings	Hours	Topic, description
Introduction	TBA	3	- Introduction to Design Thinking
Displays	TBA	3	- Current display technologies
Controls	TBA	3	- Current control interface technology
Rapid Prototyping	TBA	3	- Methods of rapid prototyping - Applications of rapid prototyping to HCI
The Internet of Things (IoT)	TBA	3	- Current Trends in IoT - Embedded systems (hardware and software tools) - Wearable computing
HCI & Biomedical Engineering	TBA	3	- Biomedical devices - Ubiquitous computing - Affective computing - Safety issues
HCI & Age	TBA	3	- memory, attention, human error and decision making - modelling of human perception and information processing
HCI & Robotics	TBA	3	- Biomimetic robotic systems - The Uncanny Valley - Haptics / Multimodal interfaces
HCI, Culture & Gender	TBA	3	- HCI factors related to culture - HCI factors related to gender
Student Presentations	n/a	6	- TBD

Note: The schedule is tentative. There may be some changes in the schedule that will be announced in the class and/or posted on the course website.

Important Notes

1. All of the required course-specific written reports will be assessed not only on their technical/academic merit, but also on the communication skills exhibited through these reports.
2. All assignment and lab/tutorial reports must have the standard cover page which can be completed and printed from the Department website at www.ee.ryerson.ca. The cover page must be signed by the student(s) prior to submission of the work. Submissions without the cover pages **will not** be accepted.
3. No makeups will be provided for midterm exam or assignments. If any of the aforementioned are missed for an officially approved reason the associated weight will be assigned to the final exam.
4. Students who miss a final exam for an officially approved reason and who cannot be given a make-up exam prior to the submission of final course grades, must be given a grade of INC (as outlined in the *Grading Promotion and Academic Standing Policy*) and a make-up exam (normally within 2 weeks of the beginning of the next semester) that carries the same weight and measures the same knowledge, must be scheduled.

5. Medical or Compassionate documents for the missing of an exam must be submitted within 3 working days of the exam. Students are responsible for notifying the instructor that they will be missing an exam as soon as possible.
6. Requests for accommodation of specific religious or spiritual observance must be presented to the instructor no later than two weeks prior to the conflict in question (in the case of final examinations within two weeks of the release of the examination schedule). In extenuating circumstances this deadline may be extended. If the dates are not known well in advance because they are linked to other conditions, requests should be submitted as soon as possible in advance of the required observance. Given that timely requests will prevent difficulties with arranging constructive accommodations, students are strongly encouraged to notify the instructor of an observance accommodation issue within the first two weeks of classes.
7. The results of the first assignment and/or midterm exam will be returned to students before the deadline to drop a course in good Academic Standing.
8. Students are required to adhere to all relevant University policies including but not limited to:
 Student Code of Academic Conduct, <http://www.ryerson.ca/senate/policies/pol60.pdf>
 Student Code of Non-Academic Conduct, <http://www.ryerson.ca/senate/policies/pol61.pdf>
 Undergraduate Academic Consideration and Appeals, <http://www.ryerson.ca/senate/policies/pol134.pdf>
 Examination Policy, <http://www.ryerson.ca/senate/policies/pol135.pdf>
 Accom. of Student Relig., Abor. and Spir. Observance, <http://www.ryerson.ca/senate/policies/pol150.pdf>
 Est. of Stud. Email Accts for Official Univ. Commun., <http://www.ryerson.ca/senate/policies/pol157.pdf>
9. Students are required to obtain and maintain a Ryerson Matrix e-mail account for timely communications between the instructor and the students.
10. Any changes in the course outline, test dates, marking or evaluation will be discussed in class prior to being implemented.
11. In-class use of cellular telephones is not permitted. Please turn off your cell phone prior to class. Quiet use of laptops, text-messengers and similar non-audible devices are permitted only in the rear rows of the class. This restriction allows use of such devices by their users while limiting audible and visual distractions to other students. This policy may change without notice.
12. Labs, projects handed in past the due date and time will not be accepted for marking and will receive a mark of ZERO.
13. Students found to have plagiarized *any* portion of their labs and final project will receive a grade of zero on the *complete* project. This may automatically will lead to a failing grade.

Name of Instructor	James Andrew Smith, PhD, PEng	Signature of Instructor		Date	July 18, 2014
Name of Graduate Program Director		Signature of Graduate Program Director		Date	

1. Kishor S. Trivedi, **Probability and Statistics with Reliability, Queuing, and Computer Science Applications**, 2nd Edition, John Wiley and Sons, 2001.
2. R. A. Sahner, K. S. Trivedi and A. Puliafito, *Performance and Reliability Analysis of Computer Systems: An Example-Based Approach Using the SHARPE Software Package*, Kluwer Academic Publishers, 1996.
3. A. O. Allen, *Probability, Statistics, and Queuing Theory With Computer Science Applications*, Academic Press, 2 edition, 1990.
4. D. P. Siewiorek, R. S. Swarz, *Reliable Computer Systems: Design and Evaluation*, AK Peters, Ltd., 3rd edition, 1998.
5. F. Bause and P. Kritzinger, *Stochastic Petri Nets. An Introduction to the Theory*, Vieweg, 2002.
6. E. D. Lazowska, J. Zahorjan, G. S. Graham, K. C. Sevcik, *Quantitative System Performance, Computer System Analysis Using Queuing Network Models*, Prentice Hall, 1984. This book is available online at <http://www.cs.washington.edu/homes/lazowska/qsp/>